

CLAIMS

1. A flip-chip-type gallium nitride compound semiconductor light-emitting device comprising a substrate, an n-type semiconductor layer, a light-emitting layer, and a p-type semiconductor layer, a negative electrode provided on said n-type semiconductor layer, and a positive electrode provided on said p-type semiconductor layer, the layers being successively provided atop said substrate in this order and being composed of a gallium nitride compound semiconductor, wherein said positive electrode has a three-layer structure comprising an ohmic electrode layer composed of rhodium which is in contact with said p-type semiconductor layer, an adhesion layer composed of titanium which is provided on said ohmic electrode layer and has a thickness of 10 Å or more, and a bonding pad layer provided on said adhesion layer and being composed of a metal selected from the group consisting of gold, aluminum, nickel, and copper, or composed of an alloy containing at least one of these metals.

2. A flip-chip-type gallium nitride compound semiconductor light-emitting device according to claim 1, wherein said adhesion layer has a thickness of 500 Å to 3,000 Å.

3. A flip-chip-type gallium nitride compound semiconductor light-emitting device according to claim 2, wherein said adhesion layer has a thickness of 1,000 Å or more.

4. A flip-chip-type gallium nitride compound semiconductor light-emitting device according to any one of claims 1 to 3, wherein said ohmic electrode layer has a thickness of 100 Å to 3,000 Å.

5. A flip-chip-type gallium nitride compound semiconductor light-emitting device according to claim 4, wherein said ohmic electrode layer has a thickness of 500 Å to 2,000 Å.

6. A flip-chip-type gallium nitride compound

semiconductor light-emitting device according to any one of claims 1 to 5, wherein said bonding pad layer has a thickness of at least 1,000 Å.

5       7. A flip-chip-type gallium nitride compound semiconductor light-emitting device according to claim 6, wherein said bonding pad layer has a thickness of 3,000 Å to 5,000 Å.

10       8. A flip-chip-type gallium nitride compound semiconductor light-emitting device according to any one of claims 1 to 7, wherein said bonding pad layer is composed of gold.

15       9. A positive electrode for use in a gallium nitride compound semiconductor light-emitting device, wherein said positive electrode has a three-layer structure comprising an ohmic electrode layer composed of rhodium which is brought into contact with a p-type semiconductor layer of said compound semiconductor light-emitting device, an adhesion layer composed of titanium which is provided on said ohmic electrode layer and has a thickness of 10 Å or more, and a bonding pad layer provided on said adhesion layer, said bonding pad layer being composed of a metal selected from the group consisting of gold, aluminum, nickel, and copper, or composed of an alloy containing at least one of these metals.

25       10. A positive electrode for use in gallium nitride compound semiconductor light-emitting device according to claim 9, wherein said adhesion layer has a thickness of 500 Å to 3,000 Å.

30       11. A positive electrode for use in a gallium nitride compound semiconductor light-emitting device according to claim 9 or 10, wherein said adhesion layer has a thickness of 1,000 Å or more.

35       12. A light-emitting diode comprising a flip-chip-type gallium nitride compound semiconductor light-emitting device according to any one of claims 1 to 8.

13. A lamp comprising a flip-chip-type gallium

nitride compound semiconductor light-emitting device  
according to any one of claims 1 to 8.